



US-163

SEQUENCE LISTING

<110> TAKASHITA, Ryo
YASUEDA, Hisashi
GUNJI, Yoshiya

<120> METHOD FOR PRODUCING ALCOHOL BY USING MICROORGANISM

<130>

<150> JP 2001-270903
<151> 2001-09-06

<160> 5

<170> PatentIn Ver. 2.0

<210> 1
<211> 38
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 1

ggtaagttta tgcagcgagt tcacactatac acggcggt 38

<210> 2

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 2

tcgaagcttc cccggttcag gccgccccgg 30

<210> 3

<211> 39

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 3

cgtgaattcc cgtcggagca ttccggataac gtgctcatc 39

<210> 4

<211> 30

<212> DNA

<213> Artificial Sequence

US-163

<220>
<223> Description of Artificial Sequence:primer

<400> 4
attaagctta agcgtgatag tcttcgagct tgcggtccag g 41

<210> 5
<211> 7188
<212> DNA
<213> Methylococcus capsulatus

<220>
<221> CDS
<222> (1478)..(3061)

<220>
<221> CDS
<222> (3142)..(4311)

<220>
<221> CDS
<222> (4328)..(4753)

<220>
<221> CDS
<222> (4764)..(5276)

<220>
<221> CDS
<222> (5432)..(5743)

<220>
<221> CDS
<222> (5756)..(6802)

<400> 5
cgatcgttt cggctttt ccatcaggcc tcccggcgaa aatggggaa gagggcgacc 60
tccgtccccca ccgcctcgcc cagtacacgg cgagagaagt gctcgatcg ggcgggtgtcg 120
gcttcctgcgat ggatgtcgat ttgttcaac accaaaaaaa tacggccggc gtacttccgg 180
acctctcatg gggggactcc agttcgccct cactcaccgc ctggcgccg gggggacga 240
acaggcgccg atcgcaactgc ggcacgcgc cccaggcggt gtcgggtgtg tggcgaaaca 300
ccgagccgac gccgggtgtg tccacgatgc gcacgcgcatt ccccaggaggc ggcgaggcg 360
tccggatcatg atatcccgca cggcccttcgc gttggccggg ttggccggct cgggtatgt 420
atcccgcgacccatgggac ggtatcgaa gggggctgcct tccacgcggc ggacgggtat 480
ccgggggggaa tagccgttagg cgagcacggg caccaccggag gtcaacgcgc cccggccgt 540
gggcagcagg ttctcacccca gcagcgcgtt gatcaggctg gtcttcccccc gtttgaactg 600
gccgaccgtc aggacgtcgaa aatggccggc ctgcagctg tcacgcggg cgagggcg 660
gcccggccgcg gcccggccgcg gtccggccgc tcgtcgatca ggctcaggag ttccgggttt 720
agatcccgat agccggcgtt tggcgccatca cggcgatcg gccaacgggg gatcgcgttc 780
attcccgatgtt ggtcgatcg atgacgggtgc ggatttcgtt gatcgcgtcg gggggaaagc 840
cgccctccatcg tgcgtgtgtt accagcgatgg cggcgatgggg ggcaatgtat acgcgtatca 900
ccttgcgttc ggtacatag ctctcgatcc actgaacctg cggccatcg gcgttgagga 960
tcgaacagga ttacgggaga tctggccgcag ttcgtcgccgac gacaggttt cggcgccgc 1020
gaatcgatcg ctctatgaca tattttggca tggttatcgat ccttacggat ttggtaagga 1080
aaaaataggc ttgtattgtt cttatccgaa gataacgcgtt ttccggccgc cccgattttt 1140

US-163

tcatggatca cgattccatt gaatgcggcg aaagtctcg ggtccggta tgaatgaaga	1200
gttatggcgg cccagtagt caccgttatg tccgatggct gtatcaaaca aagacacgtg	1260
tagtgatatc ggacaactcg tccatccccg tcggagcatt cggtataacgt gctcatcggt	1320
ccaaaatatt gatatacggt atacgtatcc gaagaataaa gttggcacga tccctgtAAC	1380
taggttgtca cgacctcgTC ggaggTTGta tgtCCGGTGT tccgtgacgt catcgggcat	1440
tcatcattca tagaatgtgt tacggaggaa acaagta atg gca ctt agc acc gca	1495
Met Ala Leu Ser Thr Ala	
1 5	
acc aag gcc gcg acg gac gcg ctg gct gcc aat cgg gca ccc acc acc	1543
Thr Lys Ala Ala Thr Asp Ala Leu Ala Ala Asn Arg Ala Pro Thr Ser	
10 15 20	
gtg aat gca cag gaa gtg cac cgt tgg ctc cag agc ttc aac tgg gat	1591
Val Asn Ala Gln Glu Val His Arg Trp Leu Gln Ser Phe Asn Trp Asp	
25 30 35	
ttc aag aac aac cgg acc aag tac gcc acc aag tac aag atg gcg aac	1639
Phe Lys Asn Asn Arg Thr Lys Tyr Ala Thr Lys Tyr Lys Met Ala Asn	
40 45 50	
gag acc aag gaa cag ttc aag ctg atc gcc aag gaa tat gcg cgc atg	1687
Glu Thr Lys Glu Gln Phe Lys Leu Ile Ala Lys Glu Tyr Ala Arg Met	
55 60 65 70	
gag gca gtc aag gac gaa agg cag ttc ggt agc ctg cag gat gcg ctg	1735
Glu Ala Val Lys Asp Glu Arg Gln Phe Gly Ser Leu Gln Asp Ala Leu	
75 80 85	
acc cgc ctc aac gcc ggt gtt cgc gtt cat ccg aag tgg aac gag acc	1783
Thr Arg Leu Asn Ala Gly Val Arg Val His Pro Lys Trp Asn Glu Thr	
90 95 100	
atg aaa gtg gtt tcg aac ttc ctg gaa gtg ggc gaa tac aac gcc atc	1831
Met Lys Val Val Ser Asn Phe Leu Glu Val Gly Glu Tyr Asn Ala Ile	
105 110 115	
gcc gct acc ggg atg ctg tgg gat tcc gcc cag gcg gcg gaa cag aag	1879
Ala Ala Thr Gly Met Leu Trp Asp Ser Ala Gln Ala Ala Glu Gln Lys	
120 125 130	
aac ggc tat ctg gcc cag gtg ttg gat gaa atc cgc cac acc cac cag	1927
Asn Gly Tyr Leu Ala Gln Val Leu Asp Glu Ile Arg His Thr His Gln	
135 140 145 150	
tgt gcc tac gtc aac tac tac ttc gcg aag aac ggc cag gac ccg gcc	1975
Cys Ala Tyr Val Asn Tyr Tyr Phe Ala Lys Asn Gly Gln Asp Pro Ala	
155 160 165	
ggt cac aac gat gct cgc cgc acc cgt acc atc ggt ccg ctg tgg aag	2023
Gly His Asn Asp Ala Arg Arg Thr Arg Thr Ile Gly Pro Leu Trp Lys	
170 175 180	
ggc atg aag cgc gtg ttt tcc gac ggc ttc att tcc ggc gac gcc gtg	2071
Gly Met Lys Arg Val Phe Ser Asp Gly Phe Ile Ser Gly Asp Ala Val	
185 190 195	
gaa tgc tcc ctc aac ctg cag ctg gtg ggt gag gcc tgc ttc acc aat	2119
Glu Cys Ser Leu Asn Leu Gln Leu Val Gly Glu Ala Cys Phe Thr Asn	
200 205 210	
ccg ctg atc gtc gca gtg acc gaa tgg gct gcc gac ggc gat gaa	2167
Pro Leu Ile Val Ala Val Thr Glu Trp Ala Ala Ala Asn Gly Asp Glu	
215 220 225 230	
atc acc ccg acg gtg ttc ctg tcg atc gag acc gac gaa ctg cgc cac	2215
Ile Thr Pro Thr Val Phe Leu Ser Ile Glu Thr Asp Glu Leu Arg His	
235 240 245	
atg gcc aac ggt tac cag acc gtc gtt tcc atc gcc aac gat ccg gct	2263
Met Ala Asn Gly Tyr Gln Thr Val Val Ser Ile Ala Asn Asp Pro Ala	

US-163

250	255	260	
tcc gcc aag tat ctc aac acg gac ctg aac aac gcc ttc tgg acc cag			2311
Ser Ala Lys Tyr Leu Asn Thr Asp Leu Asn Asn Ala Phe Trp Thr Gln			
265	270	275	
cag aag tac ttc acg ccg gtg ttg ggc atg ctg ttc gag tat ggc tcc			2359
Gln Lys Tyr Phe Thr Pro Val Leu Gly Met Leu Phe Glu Tyr Gly Ser			
280	285	290	
aag ttc aag gtc gag ccg tgg gtc aag acg tgg gac cgc tgg gtg tac			2407
Lys Phe Lys Val Glu Pro Trp Val Lys Thr Trp Asp Arg Trp Val Tyr			
295	300	305	310
gag gac tgg ggc ggc atc tgg atc ggc cgt ctg ggc aag tac ggg gtg			2455
Glu Asp Trp Gly Gly Ile Trp Ile Gly Arg Leu Gly Lys Tyr Gly Val			
315	320	325	
gag tcg ccg cgc agc ctc aag gac gcc aag cag gac gct tac tgg gct			2503
Glu Ser Pro Arg Ser Leu Lys Asp Ala Lys Gln Asp Ala Tyr Trp Ala			
330	335	340	
cac cac gac ctg tat ctg ctg gct tat gcg ctg tgg ccg acc ggc ttc			2551
His His Asp Leu Tyr Leu Leu Ala Tyr Ala Leu Trp Pro Thr Gly Phe			
345	350	355	
ttc cgt ctg gcg ctg ccg gat cag gaa gaa atg gag tgg ttc gag gcc			2599
Phe Arg Leu Ala Leu Pro Asp Gln Glu Glu Met Glu Trp Phe Glu Ala			
360	365	370	
aac tac ccc ggc tgg tac gac cac tac ggc aag atc tac gag gaa tgg			2647
Asn Tyr Pro Gly Trp Tyr Asp His Tyr Gly Lys Ile Tyr Glu Glu Trp			
375	380	385	390
cgc gcc cgc ggt tgc gag gat ccg tcc tcg ggc ttc atc ccg ctg atg			2695
Arg Ala Arg Gly Cys Glu Asp Pro Ser Ser Gly Phe Ile Pro Leu Met			
395	400	405	
tgg ttc atc gaa aac aac cat ccc atc tac atc gat cgc gtg tcg caa			2743
Trp Phe Ile Glu Asn Asn His Pro Ile Tyr Ile Asp Arg Val Ser Gln			
410	415	420	
gtg ccg ttc tgc ccg agc ttg gcc aag ggc gcc agc acc ctg cgc gtg			2791
Val Pro Phe Cys Pro Ser Leu Ala Lys Gly Ala Ser Thr Leu Arg Val			
425	430	435	
cac gag tac aac ggc gag atg cac acc ttc agc gac cag tgg ggc gag			2839
His Glu Tyr Asn Gly Glu Met His Thr Phe Ser Asp Gln Trp Gly Glu			
440	445	450	
cgc atg tgg ctg gcc gag ccg gag cgc tac gag tgc cag aac atc ttc			2887
Arg Met Trp Leu Ala Glu Pro Glu Arg Tyr Glu Cys Gln Asn Ile Phe			
455	460	465	470
gaa cag tac gaa gga cgc gaa ctg tcg gaa gtg atc gcc gaa ctg cac			2935
Glu Gln Tyr Glu Gly Arg Glu Leu Ser Glu Val Ile Ala Glu Leu His			
475	480	485	
ggg ctg cgc agt gat ggc aag acc ctg atc gcc cag ccg cat gtc cgt			2983
Gly Leu Arg Ser Asp Gly Lys Thr Leu Ile Ala Gln Pro His Val Arg			
490	495	500	
ggc gac aag ctg tgg acg ttg gac gat atc aaa cgc ctg aac tgc gtc			3031
Gly Asp Lys Leu Trp Thr Leu Asp Asp Ile Lys Arg Leu Asn Cys Val			
505	510	515	
ttc aag aac ccg gtg aag gca ttc aat tga aacgggtgtc gggctccgtc			3081
Phe Lys Asn Pro Val Lys Ala Phe Asn			
520	525		
acagggcgaa gccccacgca cgatcggtcg atcaacctca aaccaaaaag gaacatcgat			3141
atg agc atg tta gga gaa aga cgc cgc ggt ctg acc gat ccg gaa atg			3189
Met Ser Met Leu Gly Glu Arg Arg Gly Leu Thr Asp Pro Glu Met			

US-163													
1													
g	c	g	c	g	c	t	t	a	a	g	g	c	a
Ala	Ala	Val	Ile	Leu	Lys	Ala	Leu	Pro	Glu	Ala	Pro	Leu	Asp
20								25				30	
a	a	g	a	g	t	t	c	t	c	a	t	g	a
Asn	Lys	Met	Gly	Tyr	Phe	Val	Thr	Pro	Arg	Trp	Lys	Arg	Leu
35							40				45		
t	a	g	a	g	c	t	t	g	c	a	c	t	g
Tyr	Glu	Ala	Leu	Thr	Val	Tyr	Ala	Gln	Pro	Asn	Ala	Asp	Trp
50						55				60			Ile
g	g	g	c	t	g	a	c	g	c	a	g	t	g
Gly	Gly	Leu	Asp	Trp	Gly	Asp	Trp	Thr	Gln	Lys	Phe	His	Gly
65					70			75			80		
c	c	t	t	g	g	a	g	g	c	g	a	t	g
Pro	Ser	Trp	Gly	Asn	Glu	Thr	Thr	Glu	Leu	Arg	Thr	Val	Asp
85					90			95					Trp
a	a	c	c	g	c	c	t	g	c	c	t	g	c
Lys	His	Arg	Asp	Pro	Leu	Arg	Arg	Trp	His	Ala	Pro	Tyr	Val
100					105			110					Lys
a	a	g	c	g	a	t	g	c	t	c	g	t	c
Lys	Ala	Glu	Glu	Trp	Arg	Tyr	Thr	Asp	Arg	Phe	Leu	Gln	Gly
115					120			125					Tyr
g	c	g	a	c	t	c	g	g	a	c	t	g	t
Ala	Asp	Gly	Gln	Ile	Arg	Ala	Met	Asn	Pro	Thr	Trp	Arg	Asp
130					135			140					Glu
a	t	c	c	t	t	g	g	t	c	t	a	g	t
Ile	Asn	Arg	Tyr	Trp	Gly	Ala	Phe	Leu	Phe	Asn	Glu	Tyr	Gly
145					150			155					Leu
a	a	c	c	t	c	g	g	g	c	t	g	a	c
Asn	Ala	His	Ser	Gln	Gly	Ala	Arg	Glu	Ala	Leu	Ser	Asp	Val
165					170			175					Thr
g	t	c	g	c	t	t	g	a	a	g	t	g	t
Val	Ser	Leu	Ala	Phe	Trp	Gly	Phe	Asp	Lys	Ile	Asp	Ile	Gln
180					185			190					Met
a	t	c	c	g	a	c	t	c	g	a	t	g	c
Ile	Gln	Leu	Glu	Arg	Gly	Phe	Leu	Ala	Lys	Ile	Val	Pro	Gly
195					200			205					Phe
g	a	t	c	g	c	t	g	a	t	g	t	g	c
Glu	Ser	Thr	Ala	Val	Pro	Lys	Ala	Glu	Trp	Thr	Asn	Gly	Glu
210					215			220					Val
a	a	g	c	c	t	g	g	t	c	g	t	g	t
Lys	Ser	Ala	Arg	Leu	Ala	Val	Glu	Gly	Leu	Trp	Gln	Glu	Val
225					230			235					Phe
t	g	a	a	g	g	c	t	c	t	t	g	c	t
Trp	Asn	Glu	Ser	Ala	Phe	Ser	Val	His	Ala	Val	Tyr	Asp	Ala
245					250			255					Leu
g	t	c	g	c	t	g	g	t	c	g	t	g	t
Gly	Gln	Phe	Val	Arg	Arg	Glu	Phe	Phe	Gln	Arg	Leu	Ala	Pro
260					265			270					Arg
g	c	a	t	c	g	c	t	a	c	t	g	a	t
Gly	Asp	Asn	Leu	Thr	Pro	Phe	Phe	Ile	Asn	Gln	Ala	Gln	Thr
275					280			285					Tyr
c	a	t	g	c	a	g	t	t	a	c	t	g	t
Gln	Ile	Ala	Lys	Gln	Gly	Val	Gln	Asp	Leu	Tyr	Tyr	Asn	Cys
290					295			300					Leu
													Gly

US-163

gac gat ccg gag ttc agc gat tac aac cgt acc gtg atg cgc aac tgg	4101
Asp Asp Pro Glu Phe Ser Asp Tyr Asn Arg Thr Val Met Arg Asn Trp	
305 310 315 320	
acc ggc aag tgg ctg gag ccc acg atc gcc gct ctg cgc gac ttc atg	4149
Thr Gly Lys Trp Leu Glu Pro Thr Ile Ala Ala Leu Arg Asp Phe Met	
325 330 335	
ggg ctg ttt gcg aag ctg ccg gcg ggc acc act gac aag gaa gaa atc	4197
Gly Leu Phe Ala Lys Leu Pro Ala Gly Thr Thr Asp Lys Glu Glu Ile	
340 345 350	
acc gcg tcc ctg tac cgg gtg gtc gac gac tgg atc gag gac tac gcc	4245
Thr Ala Ser Leu Tyr Arg Val Val Asp Asp Trp Ile Glu Asp Tyr Ala	
355 360 365	
agc gcg atc gac ttc aag gcg gac cgc gat cag atc gtt aaa gcg gtt	4293
Ser Ala Ile Asp Phe Lys Ala Asp Arg Asp Gln Ile Val Lys Ala Val	
370 375 380	
ctg gca gga ttg aaa taa tagaggaact attacg atg agc gta aac agc aac	4345
Leu Ala Gly Leu Lys	
Met Ser Val Asn Ser Asn 1 5	
385	
gca tac gac gcc ggc atc atg ggc ctg aaa ggc aag gac ttc gcc gat	4393
Ala Tyr Asp Ala Gly Ile Met Gly Leu Lys Gly Lys Asp Phe Ala Asp	
10 15 20	
cag ttc ttt gcc gac gaa aac caa gtg gtc cat gaa agc gac acg gtc	4441
Gln Phe Phe Ala Asp Glu Asn Gln Val Val His Glu Ser Asp Thr Val	
25 30 35	
gtt ctg gtc ctc aag aag tcg gac gag atc aat acc ttt atc gag gag	4489
Val Leu Val Leu Lys Lys Ser Asp Glu Ile Asn Thr Phe Ile Glu Glu	
40 45 50	
atc ctt ctg acg gac tac aag aac gtc aat ccg acg gta aac gtc	4537
Ile Leu Leu Thr Asp Tyr Lys Lys Asn Val Asn Pro Thr Val Asn Val	
55 60 65 70	
gaa gac cgc gcg ggt tac tgg tgg atc aag gcc aac ggc aag atc gag	4585
Glu Asp Arg Ala Gly Tyr Trp Trp Ile Lys Ala Asn Gly Lys Ile Glu	
75 80 85	
gtc gat tgc gac gag att tcc gag ctg ttg ggg cg ^g cag ttc aac gtc	4633
Val Asp Cys Asp Glu Ile Ser Glu Leu Leu Gly Arg Gln Phe Asn Val	
90 95 100	
tac gac ttc ctc gtc gac gtt tcc tcc acc atc ggc cg ^g gcc tat acc	4681
Tyr Asp Phe Leu Val Asp Val Ser Ser Thr Ile Gly Arg Ala Tyr Thr	
105 110 115	
ctg ggc aac aag ttc acc att acc agt gag ctg atg ggc ctg gac cgc	4729
Leu Gly Asn Lys Phe Thr Ile Thr Ser Glu Leu Met Gly Leu Asp Arg	
120 125 130	
aag ctc gaa gac tat cac gct taa ggagaatgac atg gcg aaa ctg ggt	4778
Lys Leu Glu Asp Tyr His Ala	
135 140 1 5	
ata cac agc aac gac acc cgc gac gcc tgg gtg aac aag atc gcg cag	4826
Ile His Ser Asn Asp Thr Arg Asp Ala Trp Val Asn Lys Ile Ala Gln	
10 15 20	
ctc aac acc ctg gaa aaa gcg gcc gag atg ctg aag cag ttc cg ^g atg	4874
Leu Asn Thr Leu Glu Lys Ala Ala Glu Met Leu Lys Gln Phe Arg Met	
25 30 35	
gac cac acc acg ccg ttc cgc aac agc tac gaa ctg gac aac gac tac	4922
Asp His Thr Thr Pro Phe Arg Asn Ser Tyr Glu Leu Asp Asn Asp Tyr	
40 45 50	
ctc tgg atc gag gcc aag ctc gaa gag aag gtc gcc gtc ctc aag gca	4970

US-163

Leu Trp Ile Glu Ala Lys Leu Glu Glu Lys Val Ala Val Leu Lys Ala				
55	60	65		
cgc gcc ttc aac gag gtg gac ttc cgt cat aag acc gct ttc ggc gag			5018	
Arg Ala Phe Asn Glu Val Asp Phe Arg His Lys Thr Ala Phe Gly Glu				
70	75	80	85	
gat gcc aag tcc gtt ctg gac ggc acc gtc gcg aag atg aac gcg gcc			5066	
Asp Ala Lys Ser Val Leu Asp Gly Thr Val Ala Lys Met Asn Ala Ala				
90	95	100		
aag gac aag tgg gag gcg gag aag atc cat atc ggt ttc cgc cag gcc			5114	
Lys Asp Lys Trp Glu Ala Glu Lys Ile His Ile Gly Phe Arg Gln Ala				
105	110	115		
tac aag ccg ccg atc atg ccg gtg aac tat ttc ctg gac ggc gag cgt			5162	
Tyr Lys Pro Pro Ile Met Pro Val Asn Tyr Phe Leu Asp Gly Glu Arg				
120	125	130		
cag ttg ggg acc cgg ctg atg gaa ctg cgc aac ctc aac tac tac gac			5210	
Gln Leu Gly Thr Arg Leu Met Glu Leu Arg Asn Leu Asn Tyr Tyr Asp				
135	140	145		
acg ccg ctg gaa gaa ctg cgc aaa cag cgc ggt gtg cgg gtg gtg cat			5258	
Thr Pro Leu Glu Glu Leu Arg Lys Gln Arg Gly Val Arg Val Val His				
150	155	160	165	
ctg cag tcg ccg cac tga agggaggaag tctcgccctg gacgcgacgg			5306	
Leu Gln Ser Pro His				
170				
catcgccgtg aagtccaggg ggcaggatg ccgttccggg ccggcaggct ggcccggaat			5366	
ctctggttt cagggggcgt gccggccac ggctcccccc ctccatctt cgtaaggaaa			5426	
tcacc atg gtc gaa tcg gca ttt cag cca ttt tcg ggc gac gca gac gaa			5476	
Met Val Glu Ser Ala Phe Gln Pro Phe Ser Gly Asp Ala Asp Glu				
1	5	10	15	
tgg ttc gag gaa cca cgg ccc cag gcc ggt ttc ttc cct tcc gcg gac			5524	
Trp Phe Glu Glu Pro Arg Pro Gln Ala Gly Phe Phe Pro Ser Ala Asp				
20	25	30		
tgg cat ctg ctc aaa cgg gac gag acc tac gca gcc tat gcc aag gat			5572	
Trp His Leu Leu Lys Arg Asp Glu Thr Tyr Ala Ala Tyr Ala Lys Asp				
35	40	45		
ctc gat ttc atg tgg cgg tgg gtc atc gtc cgg gaa gaa agg atc gtc			5620	
Leu Asp Phe Met Trp Arg Trp Val Ile Val Arg Glu Glu Arg Ile Val				
50	55	60		
cag gag ggt tgc tcg atc agc ctg gag tcg tcg atc cgc gcc gtg acg			5668	
Gln Glu Gly Cys Ser Ile Ser Leu Glu Ser Ser Ile Arg Ala Val Thr				
65	70	75		
cac gta ctg aat tat ttt ggt atg acc gaa caa cgc gcc ccg gca gag			5716	
His Val Leu Asn Tyr Phe Gly Met Thr Glu Gln Arg Ala Pro Ala Glu				
80	85	90	95	
gac cgg acc ggc gga gtt caa cat tga acaggtaaat tt atg cag cga gtt			5767	
Asp Arg Thr Gly Gly Val Gln His				
100		1		
cac act atc acg gcg gtg acg gag gat ggc gaa tcg ctc cgc ttc gaa			5815	
His Thr Ile Thr Ala Val Thr Glu Asp Gly Glu Ser Leu Arg Phe Glu				
5	10	15	20	
tgc cgt tcg gac gag gac gtc atc acc gcc gcc ctg cgc cag aac atc			5863	
Cys Arg Ser Asp Glu Asp Val Ile Thr Ala Ala Leu Arg Gln Asn Ile				
25	30	35		
ttt ctg atg tcg tcc tgc cgg gag ggc ggc tgt gcg acc tgc aag gcc			5911	
Phe Leu Met Ser Ser Cys Arg Glu Gly Gly Cys Ala Thr Cys Lys Ala				
40	45	50		

US-163

ttg tgc agc gaa ggg gac tac gac ctc aag ggc tgc agc gtt cag gcg	5959
Leu Cys Ser Glu Gly Asp Tyr Asp Leu Lys Gly Cys Ser Val Gln Ala	
55 60 65	
ctg ccg ccg gaa gag gag gaa ggg ttg gtg ttg ttg tgc cgg acc	6007
Leu Pro Pro Glu Glu Glu Glu Gly Leu Val Leu Leu Cys Arg Thr	
70 75 80	
tac ccg aag acc gac ctg gaa atc gaa ctg ccc tat acc cat tgc cgc	6055
Tyr Pro Lys Thr Asp Leu Glu Ile Glu Leu Pro Tyr Thr His Cys Arg	
85 90 95 100	
atc agt ttt ggt gag gtc ggc agt ttc gag gcg gag gtc gtc ggc ctc	6103
Ile Ser Phe Gly Glu Val Gly Ser Phe Glu Ala Glu Val Val Gly Leu	
105 110 115	
aac tgg gtt tcg agc aac acc gtc cag ttt ctt ttg cag aag cgg ccc	6151
Asn Trp Val Ser Ser Asn Thr Val Gln Phe Leu Leu Gln Lys Arg Pro	
120 125 130	
gac gag tgc ggc aac cgt ggc gtg aaa ttc gaa ccc ggt cag ttc atg	6199
Asp Glu Cys Gly Asn Arg Gly Val Lys Phe Glu Pro Gly Gln Phe Met	
135 140 145	
gac ctg acc atc ccc ggc acc gat gtc tcc cgc tcc tac tcg ccg gcg	6247
Asp Leu Thr Ile Pro Gly Thr Asp Val Ser Arg Ser Tyr Ser Pro Ala	
150 155 160	
aac ctt cct aat ccc gaa ggc cgc ctg gag ttc ctg atc cgc gtg tta	6295
Asn Leu Pro Asn Pro Glu Gly Arg Leu Glu Phe Leu Ile Arg Val Leu	
165 170 175 180	
ccg gag gga cgg ttt tcg gac tac ctg cgc aat gac gcg cgt gtc gga	6343
Pro Glu Gly Arg Phe Ser Asp Tyr Leu Arg Asn Asp Ala Arg Val Gly	
185 190 195	
cag gtc ctc tcg gtc aaa ggg cca ctg ggc gtg ttc ggt ctc aag gag	6391
Gln Val Leu Ser Val Lys Gly Pro Leu Gly Val Phe Gly Leu Lys Glu	
200 205 210	
ccg ggc atg gcg ccg cgc tat ttc gtg gcc ggc ggc acc ggg ttg gcg	6439
Arg Gly Met Ala Pro Arg Tyr Phe Val Ala Gly Gly Thr Gly Leu Ala	
215 220 225	
ccg gtg gtc tcg atg gtg cgg cag atg cag gag tgg acc gcg ccg aac	6487
Pro Val Val Ser Met Val Arg Gln Met Gln Glu Trp Thr Ala Pro Asn	
230 235 240	
gag acc cgc atc tat ttc ggt gtg aac acc gag cgc gaa ttg ttc tac	6535
Glu Thr Arg Ile Tyr Phe Gly Val Asn Thr Glu Pro Glu Leu Phe Tyr	
245 250 255 260	
atc gac gag ctc aaa tcc ctg gaa cga tcg atg cgc aat ctc acc gtg	6583
Ile Asp Glu Leu Lys Ser Leu Glu Arg Ser Met Arg Asn Leu Thr Val	
265 270 275	
aag gcc tgt gtc tgg cac ccg agc ggg gac tgg gaa ggc gag cag ggc	6631
Lys Ala Cys Val Trp His Pro Ser Gly Asp Trp Glu Gly Glu Gln Gly	
280 285 290	
tcg ccc atc gat gcg ttg cgg gaa gac ctg gag tcc tcc gac gcc aac	6679
Ser Pro Ile Asp Ala Leu Arg Glu Asp Leu Glu Ser Ser Asp Ala Asn	
295 300 305	
ccg gac att tat ttg tgc ggt ccg ccg ggc atg atc gat gcc gcc tgc	6727
Pro Asp Ile Tyr Leu Cys Gly Pro Pro Gly Met Ile Asp Ala Ala Cys	
310 315 320	
gag ctg gta cgc agc cgc ggt atc ccc ggc gaa cag gtc ttc ttc gaa	6775
Glu Leu Val Arg Ser Arg Gly Ile Pro Gly Glu Gln Val Phe Phe Glu	
325 330 335 340	
aaa ttc ctg ccg tcc ggg gcg gcc tga accgggagaag taccgtgacc	6822

US-163

Lys Phe Leu Pro Ser Gly Ala Ala
345

accgagcagt tcccggccca attcctgcgt gaaatgatcg agcagctgga cgccagcatc 6882
caggagctcg cacgcaagga aaagggactt gcggcatccc tgggcacggg ccgggtcgcc 6942
gagctcaagg aatactggga ccacgttctc actcccgagg aggaatggga gctcaagcga 7002
ccatggactt ccgcgaccgg gaactgggtgt ggatctggtc ccgtctcagg cgggccccgaa 7062
cctcccgcgc caatgccggg gaggcctata tcgcccagctg tcgcccggcgc cgcgaaaaaaa 7122
cgaacaatcc tgaaacggag tcgacgggta tcgttgggaa aaaggttatc tgtcgcccta 7182
ttttgt 7188